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## Session 67PD

### Asset and Liability Analysis for Disability Insurance

**Track:** Heath Disability Insurance, Investment

**Moderator:** ANDRONICO LUCAS CASTILLO

**Panelists:** MARCO BRAVO†  
FORREST (WOODY) A. RICHEN

*Summary: Disability plans pose a number of unique investment challenges. Level premium plans, for example, produce positive cash flow in early years and negative cash flow in later years. The panelists in this session explore the characteristics of liability cash flows for disability insurance and discuss the implications for a company's investment strategy. Specific topics to be addressed include cash-flow patterns, duration analysis, asset/liability matching and investment strategies. Attendees learn a variety of techniques for analyzing their own asset and liability cash flows, as well as for optimizing their investment strategies for disability insurance.*

**MR. ANDRONICO LUCAS CASTILLO:** Our first speaker will be Marco Bravo. Marco is chartered financial analyst (CFA®) and senior portfolio manager and client investment specialist for Asset Allocation and Management Co (AAM). AAM is an investment advisory firm that works with insurance companies only, both on the life and property and casualty (P&C) sides.

Marco manages portfolios for a number of his firm's clients and is also co-author of "AAM Monthly Economic Outlook." Prior to joining AAM, Marco worked for Templeton Management Ltd. as an investor services adviser. He's a member of the Association for Investment Management and Research and Investment Analyst Society of Chicago. Marco earned his Bachelor of Commerce degree from the University of Toronto.

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†Mr. Bravo, not a member of the sponsoring organizations, is senior portfolio manager at Asset Allocation Management in Chicago, Ill.

**Note:** The chart(s) referred to in the text can be found at the end of the manuscript.

Marco is going to give us some background on the current interest rate environment and the state of the U.S. economy in general.

After Marco, we will go to Woody Richen. Woody is the vice president and actuary responsible for the individual disability line of business for Standard Insurance Company.

He will give his company's perspective on asset/liability management and its importance relative to a lot of other issues that confront individual disability writers. Woody earned his PhD in mathematics at the University of Oregon. He was an assistant professor at the University of Michigan for five years. He's been with Standard for nearly 30 years, and as I said, he's the actuary in charge of the individual disability line of business. He's also a tenor for the Portland Symphonic Choir.

After Woody, Dennis Yu will talk a little bit more in detail about the liability characteristics of disability products. Dennis has been involved in health insurance products in various capacities. He's worked for HMOs; he was involved with long-term care (LTC) with the Hartford a few years back. He joined us about a couple of years ago in individual disability pricing. He's done some work in cash flow testing.

After Dennis, I think we'll go back to Marco, and Marco will talk to us about some tools and different methodologies in constructing a strategy for disability products.

**MR. MARCO BRAVO:** As Andy mentioned, I'm a portfolio manager and I work for a company that invests solely for insurance companies, so I'm on the asset side of the business. The first question I asked myself and I asked our marketing person when he asked me if I would come down and give a speech is, "Why do you want me to talk at the Society of Actuaries? I don't really get much involved in the liability side." I think the reason is in today's interest rate environment, with yields from your investment portfolios declining daily, it's a very big concern for life insurance companies. You're looking for ways to enhance the yield from your portfolios. It's also a big factor in the pricing assumptions that the actuary is using.

I almost gave the exact same speech last week at a Life Insurance Marketing and Research Association (LIMRA) conference in front of a bunch of marketing people. I thought someone should probably combine the two conferences, have marketing people, actuaries and investment people in the same room, so you can better produce products given all the different pricing assumptions.

But I want to start with the current interest rate environment and give an overview of where we are in the economy and the economic cycle. I wish I could tell you where rates are going. Unfortunately I'm not intelligent enough to give you a good direction of where rates are going. And if there are people out there who can tell you where rates are going, they probably are lying. The only thing we know for sure with rates is that they do change over time.

Chart 1 puts things into perspective. It shows that Treasury rates are very low; they're at historical lows. In fact, rates today are even lower than this graph shows. Over the last three years rates have fallen between 200-400 basis points. These are U.S. Treasury notes, and the Treasury curve has become steeper. What that means is long-term Treasury rates are higher than short-term Treasury rates. So what's the big deal?

You probably don't invest much in Treasury rates or in Treasury types of products. But the fact is, every fixed-income purchase or security that is made within your investment portfolio is benchmarked off of U.S. Treasury notes. As yields on Treasury rates fall, the yields on the individual securities that are being purchased for your portfolios are also declining. The spread that you earn over Treasury rates depends on the riskiness of that product. We're going to get a little bit into the different types of risk that you can take on the investment side and how they're related to the liability characteristics.

The 10-year Treasury rates, which is a very common benchmark used to price various investment products in the fixed-income market, are at low levels as well (Chart 2). Over this period of time, the lowest rate is 3.31 percent; today the 10-year Treasury is at 3.25 percent. So it's even lower than where rates were a couple of weeks ago.

With the Fed meeting today, an announcement is expected tomorrow as far as future Fed policy. The market is expecting the Fed to lower rates. I'm going to talk a little bit about the Fed in just a few moments.

Why are rates low? There are a number of reasons. One of the primary reasons is that we're in kind of a sluggish economic cycle. I like to use the analogy of the economy being like a huge 747 trying to take off, which is a little bit too heavy and just can't get off the ground. One of the things that you notice if you look at past recessionary periods, and those are dictated by the shaded areas (Chart 3), this past slowdown has been much more shallow than previous slow periods. This is especially true if you compare them in the early 1980 recession and also in the 1990 recession. So we had a more shallow-type slowdown period. The main reason is that the consumer during this time continued to spend, versus in previous recessions where the consumer declined spending greatly, and it's also a combination of client and business spending.

Another reason why rates have fallen, apart from Fed Chairman Greenspan using the word deflation, is that inflation or prices continue to decline. One of the reasons we've continued to see a decline in inflation rates is that companies don't have a lot of pricing power in today's market. There's excess capacity in a lot of industries. The auto industry comes to mind as one industry where there's a lot of over-capacity. That is a big problem for companies right now, in terms of pricing power. So with the economy continuing to be in a sluggish state and with inflation

continuing to decline, and with the Fed using the word deflation, Japan-type scenario, interest rates have declined to the levels we're at today. What we need is a reversal of both the economy and inflation rates to start driving interest rates higher. I touch upon why we're in this type of economy. Business spending has declined greatly. That was the primary cause for the slowdown, which we recently experienced.

Businesses have slashed their inventory levels, which is a second reason for the turn or the slowdown in the economy. What businesses were worried about was a significant decline in consumer demand, and therefore, they cut their inventory levels to very low levels. We've reached and we've seen a pickup in inventory investment, but that combination of business spending and inventory investment has to occur before we see any substantial pickup in the economy.

Personal consumption: consumers make up two-thirds of the economy. So the way the consumer goes really is the way the economy goes. You can see versus prior recessionary periods, the consumer this time around held on fairly strong (Chart 4). One of the reasons is housing. The housing market has remained fairly strong and Chart 5 shows that. The new American pastime no longer is baseball—it's home refinancing. Most people continue to refinance their homes almost monthly now, with rates falling to the degree that they have. And that has put more disposable income into people's pockets. And they use that money to spend.

Some people are worried that consumer debt is growing. But I'm not as concerned about the absolute level of consumer debt as I am with the ability to service that debt and whether consumers can continue to be able to service their debt. One of the things we were talking about at breakfast this morning is the concern over a deflationary period, such as what Japan has experienced. Can we go that route? I believe that we're a very different country than Japan; we're much more financially sound. Our bank loans are much more financially sound. If you look at spending on auto, spending on homes, where there is a strong incentive to spend, never underestimate the U.S. consumer's propensity to spend in this country. They will spend given the incentives. It's a very different fundamental than the Japanese consumer.

Housing is strong, as I mentioned, and really what's keeping the housing market very strong is the low interest rate environment. But one thing to note from this graph is how housing had declined during the 1990 recession, and therefore, created a pent-up demand coming out of that into the recovery. We don't see that this time. So one of the concerns is that what is normally the impetus for a pickup in economic growth just isn't there at this period of time.

The other main concern as far as the Federal Reserve is concerned, is the state of the labor market. You may have read in financial journals that we're in a jobless recovery. So the economy is slowly recovering, but we're not seeing any type of recovery in the labor market. We expect that to continue. The line represents the unemployment rate, which is currently at 6.1 percent; we expect that to probably

trend a little higher (Chart 6). The monthly job growth numbers continue to show signs of weakness in the labor market. One of the reasons is that we expect the labor market to remain weak. It goes back to what I mentioned earlier, that companies don't have a lot of pricing power. Companies want to increase their earnings and they've done that by reducing the cost side by slashing their No. 1 cost, which is labor. They are not going to get much help on the revenue side by increasing prices.

So as we move into a recovery period, I think we're going to continue to see the unemployment rate trend higher, probably settling somewhere at about 6.5 to 7 percent, and with the current state of the economy, there's no reason to believe we're going to get any strong employment growth. So we need very strong economic numbers, gross domestic product (GDP) growth before we see any type of substantial improvement in the labor market. That concerns the Fed, because the continued weakness in the labor market worries consumers. Are they going to have a job next month? That could lead to a decline in consumer spending, so they are very concerned about the labor market.

Confidence has rebounded. Today the June consumer confidence numbers came out, which were slightly higher than expected. That's a good sign. The consumer has faced a lot of headwinds over this period of time. We've had two wars: Afghanistan and Iraq, we've had high energy prices, we've had fraud on the accounting side in a number of companies, so there have been a lot of reasons for confidence to decline, which it has. You'll notice it did not decline to the level we saw in the 1990 period.

Finally, I think one of the biggest problems with the state of the economy is the excess capacity in a lot of industries. Without a work-through on the capacity number, there is no reason for companies to begin spending again and to increase business spending. So we need to work through this excess capacity and that's going to require a stronger demand on the consumer and business sides.

We think rates are going to move higher. We think the economy is going to recover in the second half of this year. The experts are predicting about a 3.5 percent growth in GDP that compares to about 2 percent in the first quarter, and we're expecting about 2 percent growth in the second quarter of this year. Economists are optimistic, and by the way, they were saying the same thing about a year ago—that they were expecting 3.5 percent this year, which so far has not materialized. But reasons why we're expecting growth to move forward or move higher is a combination of very accommodative monetary policy, very accommodative fiscal policy, tax cuts—everything is pushing in the same direction. It should eventually lead to stronger demand and higher growth in the future. You can see the Fed funds rate is at very low levels, again as I mentioned earlier, we think the Federal Reserve is going to cut rates again. The question is, is it going to be 25 basis points or 50 basis points? A month ago the probability was more toward 50 basis points cut in Fed funds rate. But the data so far on the economy side has shown to be slightly better than expected, and the recent upturn in the CPI number, which is an

inflationary measure, may lead the Fed to cut only 25 basis points. I believe that this is really more of a preemptive strike against any further decline in inflation versus a strike to try to improve the economy. Again, the reason why we're in a slow economy period is the excess capacity. Lower rates do not solve that problem. Companies with good credit can come to market and raise capital very quickly and very cheaply. Lowering the Fed's fund rates further does not improve that situation. It does keep rates low for the consumer, but I think it's more of a strike against inflation versus a positive or a spur in economic growth.

The surplus on the federal government side was very short lived. We're running budget deficits again, which is definitely a positive for growth going forward. As I mentioned, tax cuts will also help. I don't know to what degree the tax cuts will spur the economy. There's a lot of debate on the impact of tax cuts, but the one thing we know is it will put more money in the consumers' pockets, and that's always a good thing.

The recent fall in the U.S. dollar helps the economy on two fronts. It helps the exporting side of the economy with exporters having a little bit better competitive advantage. It also is an aid to the decline in inflation. Following the U.S. dollar is the same as importing inflation into this country. So it's a good thing if you stay within the United States and aren't traveling to other countries. But obviously if you do travel to other countries, it may not be very good for the travelers.

As I mentioned, the Fed funds futures is predicting a further cut in rates. We expect 25 basis points tomorrow, but wouldn't be surprised if it is 50. I think if they cut 50, their statement afterwards makes reference that the economy is showing signs of improvement. If they cut 25 they probably hedged their bet and will make a statement that says we may cut further if the economy does not continue to improve. If I were a betting man I'd put my money on 25 basis points versus 50.

So I'm going to leave it there and hand it over to the liability guys. Then I'll come back and use the information that they give you on constructing an investment portfolio.

**MR. RICHEN:** We've heard a lot of good stuff from Marco about low interest rates, and although he did say that his bet was that we might see some increases and so forth, I still have to ask my question: Why worry about asset/liability analysis? I know you came to hear about that, but I'm just not sure. An individual disability actuary, (a group DI actuary too), has a lot of important things to worry about. It's setting priorities and deciding what your major risks are. You've got to ask if the asset/liability match is one of the bigger ones. I think the answer depends on whether you are satisfied with how you've taken care of your other problems. Your reserve systems, your morbidity assumptions and so forth—are your experience studies up to date? Are your underwriting rules OK? Are your reinsurance rates OK?

I think the answer for each of you in this room is going to be kind of personal. It

depends on the situation you are in, so I want to just give you a little bit of my perspective, because my answer and what I talk about is going to be a little personal here, too.

I'm a life guy really. We were a mutual company for 93 years, so those of you who have worked for mutual companies know that the culture can be a little different there. We went public 3 ½ years ago. We sold our individual life insurance block about 2 ½ years ago, and at about the same time we bought a big block of individual disability insurance. At that point we went from about \$15 million in force premiums to \$75 million in force premiums. So it really was just an accommodation line back before that purchase. But now it's big enough that we've got to take it seriously. Well over half the company is group, but we are a noticeable entity there. I wrote down some figures and I think the individual disability line is about 6 percent of our premium revenue, and about 16 percent of our earnings for the company. So that's definitely something that has to be taken seriously. We do have annuity lines; they are very small, at least in terms of earnings, revenue and capital. But they are growing, so that's my perspective.

Even though I'm a little skeptical about how much emphasis we should place on asset/liability management, we do pay attention to it. There are a lot of reasons that we do. Rating agencies ask, investors ask about how you're dealing with these issues. But more importantly, we must set pricing and reserve assumptions. You've got to test reserves. Like it or not, you should provide some relevant guidance to the investment folks.

Let's start with the rating agencies. I can't tell you about that because the information they get is public. So even though they ask about it, there's nothing I can say really. Seriously, we don't deal with the rating agencies directly. That's all handled in our corporate area now. The questions filter down, and they seem to be designed more for the asset accumulation products, the annuities and stuff. They ask us the same questions, and it's not clear to me that they really understand our business, but we answer them and do the best we can with that.

Investors ask about reserve interest assumptions. I brought along a copy of our latest 10-Q, and I really wanted to read you three or four pages out of here, but Andy says that I can't, so I'm going to have to summarize instead. In the 10-Q, it's fascinating reading. You can get it on the Internet. We do disclose some things relevant to asset/liability management. Maybe the most interesting thing that's disclosed there is the process that we use to review and reset the disabled life reserve interest assumptions. You look at projected new money rates, and you take a margin off of that, and in this environment you lower the reserve rate if you need to do it, if rates have dropped. At the same time you look at the interest margins for the total portfolio against your reserves and take that into account suitably as well. So there's quite a discussion of that in there.

I'm assuming that we wouldn't put that in the 10-Q and 10-K unless people were asking about it. So they must be interested. There is a comment in the 10-K and the 10-Q about the duration of assets and liabilities. But that's at the company level. So they must not be digging into that too much. They're mostly interested in the overall things. You've got the cash flow testing, the asset adequacy testing for reserves that we've been living with for several years. There's a comment in the 10-Q about that as well. Investors want to know.

But probably more important to us are the actuarial responsibilities about setting pricing and reserve assumptions, testing reserves and providing investment guidance. As I said before, I'm a little skeptical about how much I really want to get into the investment guidance business, so it struck me that you could take two approaches to this. Somebody is going to make the investment decision, whether you give guidance or not. You can be passive and just let it happen to you. Or you could take a more active role and try to get involved in that.

I'd like to talk about the passive approach first. On the surface it seems kind of simple. The liability cash flows for an individual disability policy are not interesting. Unlike annuities or life insurance where you've got all that disintermediation risk, you don't have that. So why not simply invest for long-term, for the highest yields in this environment, and whatever acceptable credit risk, then go for that. Then spend all your time focusing on morbidity and expense issues and the other things that actuaries have to work on. Wouldn't that be OK? It probably would.

But it isn't quite as simple as that. You have professional responsibilities and regulatory responsibilities to test your reserves. You've got gross premium valuation requirements that you've got to live up to. You've got the cash flow testing that I mentioned earlier. Maybe most importantly you've got to pick pricing assumptions. So you need to do sensitivity analysis. If you don't really know where your assumptions are going, then you'd better check the sensitivity of the premiums you're charging to the assumptions that you're making.

I mention reserve runoff test here, not because it has anything to do with asset/liability management, but it just seems a mistake to talk about actuarial responsibilities in the disability income (DI) area without mentioning testing reserve using reserve run off. So I'm not going to say any more about that.

Whenever I go to a session like this, I like to take away one or two practical tips. We tend to spend an awful lot of time on theory, and all that's important. You need to know the foundation of your science, but it's nice to take away something practical. So the first practical tip I want to give you is to let you know our approach to the gross premium valuation. You remember gross premium valuation; you look at the claim and expense cash flows and the premium cash flows, and you take present values and you make sure that your reserves are adequate to cover the difference. Well, we don't happen to have a good liability model currently for individual disability. So the first practical tip is that you may be able to just

leverage your valuation system to do your gross premium valuation. We happen to have a valuation system that is not factor driven. It takes an inventory of your policies and an inventory of your claims, and it has a file of assumptions, interest rates, and incidence and termination rates, and calculates the requisite present values on the fly. So if you just take that basic system and change your assumption file so that you're using best estimate assumptions instead of your conservative statutory valuation assumptions or slightly less-conservative GAAP valuation assumptions, you can get a pretty good read on your gross premium valuation. So there's a practical tip. Some of you are in the same boat that we are.

Marco had a great graph of declining interest rates. Chart 7 shows a longer time scale. The solid line is labeled portfolio, and I got the information from an ACLI life insurance fact book. I got the dotted-line information off the Internet. It's Moody's AAA average corporates or something like that. That dotted line actually stopped in the year 2000 or 2001, because that's as far as the ACLI fact book that I had went. If you trace the new money rates, the AAA bonds average corporates, it would show a further decline as Marco indicated.

This graph fascinates me, because when you ask yourself the question, are interest rates high or low, it really all depends on your perspective. Maybe for the structural reasons that Marco talked about we can't go through a Japan-type experience, but we have lived through a period where interest rates are pretty darn low. I don't know if you can read that all the way back. But the dip in there in the 1950s is in the 2 .5 to 3 percent range.

I remember attending a strategic planning session back in the mid- to late-1980s. Pretend there for a moment that you don't see the left-hand side of the graph. People were seriously asking if we'd see single-digit interest rates again. It's interesting how times change.

Practical tip number two: actuarial opinion on reserves. Again, I've already confessed that we don't have a good liability model for our block of business, so how do you live up to this obligation? Well, this next tip is: use the valuation system. If the liability cash flows aren't interest-sensitive and we don't have the model, you can, I think, get by. It's not optimal, but I think you can make a good faith effort, and support a good-conscience opinion simply by dropping your interest assumption to the lowest level prescribed by whatever your corporate actuary tells you you've got to test. See whether you have margins in your reserves. That worked out for us.

Even though passive investment guidance might be a way to go, it doesn't get you off the hook from really considering some of the asset/liability issues, because you do have to test reserves. So let's go to active asset/liability analysis. Now I've already confessed that I've got kind of a passive bias and we haven't done much, so you'll have to take this part of the talk with a grain of salt. I haven't gotten into this all that much, but I did talk to our investment people and asked them what

they need to know or what they would like to know. What they really want to know is what cash flows they are going to have to invest in. We need a dialogue about yield required to support reserves and pricing, and we don't dictate that. But there's a dialogue that has to take place and a tolerance for credit risk.

Dennis is going to get into this quite a bit more, but liability duration is a convenient guide for picking assets. I'm not going to give you the definition of this stuff because Dennis is going to go into that. But the general idea is that you calculate the duration of your cash flows, and you want to pick assets with the same duration so that you minimize some kind of a pricing risk between the two. But this can be subtle.

We've got old block on the left and new block on the right (Chart 8). Old block really should be labeled mature block, because that's the block of business that we bought from the other company that I mentioned early on. The new block is the block of old business that we've been writing. The bar on the left-hand side of each group is the present value of cash flows. The middle bar is the current statutory reserves and the one over to the right of that is the reserves and an estimate of risk-based capital requirements for that. So this is often a way that we look at the business internally when we're analyzing things.

The key thing about this is that even for the old block, there's a substantial amount of assets in your portfolio that is not directly related to the present value of cash flows. The present value of cash flows in the old block is only 70 percent of the total liability, which you have to invest for. And in the new block it's significantly less. If you calculate the duration of your liability cash flows, then that's only a small portion of your total investment problem, so it gets down to the question of, what duration do you pick for the amount in excess of the present value of the liability cash flow? That's a significant part of the issue. The capital certainly belongs to the owner. I'm not sure who owns the excess of the statutory liabilities over the cash flow, but basically you've got to ask yourself what sort of interest rate protection you want there.

I did a couple of numbers in Chart 9. On the old block, the cash flow duration was a little over 10. Arguably the owner's assets, the stockholders' assets, should have a fairly low duration so that the value of those is rather interest-insensitive. The blended duration of the total portfolio, if you assume that you invest your owners' share at zero, is 7.6, and if you invest it with a duration of 5, it's 9.1. So it moves it down a fair amount, and then with the new block it's really quite dramatic. The cash flow duration is 54, but the duration of the total portfolio gets you to about the same place, even a little bit lower, once you invest the capital and the statutory reserves in excess of the cash flow.

That is a fairly subtle discussion of what your investment objectives should be for that portion. That's well beyond the scope of what we're going to talk about today, or at least what I'm going to talk about. I'm not smart enough to do that, but it is a

subtle point.

Here's your third and final practical tip on calculating the durations of cash flows. The tip is to use your valuation system. Now you'll see the central theme in my practical tips. That's why this is the third and final tip, because I ran out of ways of using the valuation system other than just calculating reserves. But the valuation system that we happen to have calculates the present value to these cash flows using various assumptions. So all you need to do for duration is do it at one interest rate and shift the interest rate a little bit, and do the algebra that Dennis is going to talk about and the duration drops out. So that's it.

An interesting sidebar—remember on the new block of business the cash flows had a duration of 54, I think. Even for the old block they were up to 10. We had a problem with our annuity lines. I don't know if any of you have colleagues that are in the fixed annuity business right now, but finding interest rates high enough to go out to the street with is a real problem. At one point, because of that 54 duration and that 10 or 11 duration, we thought we had excess duration in the individual disability income (IDI) line that we could loan or sell to the annuity line to allow them to invest on longer assets to get a little higher on the yield curve and improve either their competitive position or their profit position a little bit.

There really wasn't as much there to lend to the annuity line as we thought, so we just dropped the project.

I talked about tools. Obviously, the only tool we have is our valuation system, but we are working on some others. I thought I'd mention those and then wrap up that way. We are working on a liability model. I think it's important to do that. With the current valuation system there's no way to reflect new business, and there are a lot of reasons you want to be able to reflect new business. With the valuation system you can't really do the regular sort of asset adequacy analysis that you can with a good liability model. It's a much better analytical tool, because you could test sensitivity of sales and so forth to various assumptions. And it's a better way to project our earnings for corporate.

Now Chart 10 doesn't really fit in well, but it's really cool. It does actually bear on my point just a little bit. What you've got there is the duration of the liability cash flows through time. So what you've got in this particular graph, for example, if you look at the solid line, it dips negative around seven or eight years. That's the duration of the cohorted policies once they're in their eighth policy year. In this one year of sales, once the cohort moves into its 13<sup>th</sup> policy year, then it's popped up to a positive duration, and you can follow it out like that.

The different graphs are just doing this at different interest rates, so I don't want to dwell on that, particularly. But the point is, with the graph that has this singularity negative and singularity positive, and depending upon your mix of business by age, you're trying to calculate duration and you think of this as a

calculation doing it one year of issues at a time, and taking a weighted average of the duration one year of issues at a time, the answer that you're going to get is that the future duration of your portfolio is going to vary a lot depending on your sales pattern or your lapse pattern. Without a liability model, you don't really have any way to deal with that. That's just another reason why you could be kidding yourselves if you use your simple-minded way of calculating duration that I talked about earlier in just using the valuation system, so I think the liability model is really important.

So, liability models are one thing. I think we're going to develop some monitoring tools too. We're fairly new in the line of business as I mentioned. Our focus to date has been on some rudimentary tools, sales reports and claim reports, regular financial reports. But keep in mind that we are competing for investments with the other lines of business, so we need to develop some monitoring tools to see the characteristics of the supporting assets, and we are working hard on those.

Our company divides the asset portfolio as one for each statutory line of business. That's more or less correct. We're a little more finely divided than that. Each portfolio has a duration target that our investment manager works out with a product line manager and a cash flow target. Each investment portfolio was managed to that target, so our strategy is generally buy and hold unless there are credit problems. Then we dump them, to my understanding. The amount is trued up for capital and duration things about twice a year.

So there are many things for an actuary to work on. We haven't spent a lot of time with assets, although you do kind of around the edges, and we are going to pay more attention to that in the future. So, with that I'm going to let Dennis show you his stuff.

**MR. DENNIS YU:** Basically, Woody has made my presentation more or less moot. I'm going to be talking about the liability characteristics of the IDI product.

My goal is to start thinking about investments for the IDI line, in terms of the liability characteristics. Looking at the liabilities, pricing assumes a variety of things, including premiums, investment income, benefits, expenses and required surplus. As Woody pointed out, I'm going to concentrate on his list. I want to take a look at how investment income impacts the profitability of IDI. Investment income is a significant profit driver for this product. One of the key things is that actuaries usually assume is that the earnings rate is more or less static for the projection of policies. However, the thing you run into on IDI is that you're making investments over a period of time; to the extent that your investment income is a function of your invested assets, your portfolio yields may or may not line up with what you've assumed in your pricing. I want to show you some of the impacts of that variance.

At this point, there's one other thing I need to point out as a reinsurer. In certain situations, ceding companies can terminate the reinsurance arrangement. This is an

embedded option for the ceding company, and as a reinsurer, as we're formulating our investment strategy, we need to keep this in the back of our minds. A significant block of policies may terminate, forcing the reinsurer to liquidate assets at a given point in time; the investment strategy may not have anticipated the sudden liquidation of assets. This is one reason why reinsurers may not be able to use the same earnings rate in pricing as the ceding company.

Moving on, we are looking at the characteristics of IDI and I am going to look at the hypothetical block of policies. Again, I am just looking at a generic cohort of policies; this is not meant to represent any particular block of business (Chart 11). These are somewhat arbitrary assumptions. One of the things I want to show you is the sensitivity of the profitability to the assumed earnings rate. I priced this block to return 15 percent after-tax, after RBC, assuming a 5 percent earnings rate. I want to show you the impact on the return if you change your earnings rate in your pricing. Basically it's more or less showing a 100-basis-point change in your internal rate of return (IRR) for a 25-basis-point change in that earnings rate. You may see different results using different assumptions. I just wanted to point out that returns are sensitive to what you're assuming in your earnings rate.

I want you to keep this in mind because, as Marco pointed out, interest rates have been falling. This is showing average yields on 10- and 30-year Treasuries for the past few years, and since 2000 they have been dropping. As Marco pointed out, today the 10-year Treasury is yielding 3.25 percent. I guess that answers the question, can rates go any lower? Keep Chart 11 in mind, and remember the returns on IDI are very sensitive to the earnings rate. We're in an environment of falling interest rates. That's going to have a significant impact on the profitability.

As we look at the characteristics of IDI, the first thing I want to take a look at is the behavior of net liability cash flows. In each year of the projection of these policies, I look at collected premiums less paid benefits, less expenses. One of the things to point out with a level issue-age premium is that the claims incidence rates, or claim frequency rates, increase with attained age. You end up with cash flows that are, again, positive in the early years and negative in the later years. Nothing really new here, but this will have some significant implications. The graph shows the behavior of cash flows over time for this block of policies.

One of the significant things is to remember that cash flows are positive for about the first nine years and then they go negative after that as claim incidence rates increase with attained age. The first thing you want to look at, as Woody pointed out, is duration. It's basically defined as proportional price sensitivity to interest rates. Don't confuse this with Macaulay duration—it's unfortunate that they use the term interchangeably like that. Macaulay duration is the weighted average maturity of a bond. Here we're just looking at the proportional changes in the present value of cash flows to interest rates.

Chart 12 shows the singularity in duration. Basically, you have your duration

approaching negative infinity, and then as the present value of your cash flows over time, as they change sign, they jump up to positive infinity. That is an artifact of the change in sign of your cash flows. At a certain point in time the present values changed sign.

Duration by itself probably isn't enough to tell your investment department about the characteristics of your liability. I think if I just showed this slide to Marco, he'd just throw his hands up and say, "What are you talking about and what do you want me to do about it?" So there are a couple of other things that we need to look at. One of the other things is your level of invested assets. Here I'm looking at reserves and required surplus (Chart 13). Because we have level issue-age premium early on, we're pre-funding future benefits. I graphed the behavior of your invested assets. Again, for the first nine years, your invested assets are increasing and that's where your cash flows are positive and decreasing where your cash flows are negative.

The next thing we need to look at is dollar duration of the liabilities (Chart 14). This is related to the definition of duration. This is just the absolute change, in dollars, in your present value for a given interest rate change. You start with a negative amount and it is increasing negative until the time at which your present values turn around. This is the link between the liabilities and your invested assets; once you know the dollar duration, and once you know invested assets at each point in time, you can solve for the duration of your assets that's required to cover your liability dollar duration.

Once you do that, you get a more normal looking duration curve (Chart 15). Again, a significant thing here: it's not quite as pronounced as Woody's example, but you're starting out with a relatively high duration that wears down over time. One thing to keep in mind is that your duration stays high for quite a long time. For the first 10 or 15 years the required duration is well above six or seven, which is relatively long.

What we've been talking about is long-duration liability. The significant thing is that you're investing assets over a period of time, and during that time as economic conditions change, rates go up and down. Which basically gets to the question, do the investments that you're making during that period of time support the earnings rate that you've assumed in pricing? I'm going to hand it over to Marco to help answer that question.

**MR. BRAVO:** So the asset guy is back now. He's going to tell you that yes, you can earn 7 percent on your investment portfolio. So you can all run back to your company and say, "Well, this guy in Vancouver said his firm can get you 7 percent from its investments." Yeah, right.

I was taking some notes as both Woody and Dennis were talking. Dialogue between the investment people and actuaries is very important. The duration was mentioned

more than a number of times; acceptable credit risk was also mentioned. I'm going to give the portfolio construction in the way that we do it at AAM. Keep in mind that we manage money for small- and medium-size insurance companies that tend to be a little bit more conservative. But I think the main point is that every investment portfolio is different given the risk constraints or the risk tolerance that the individual insurance company has. So no one investment portfolio meets all needs. It really is dependent upon the risk tolerance. That's the message I want to get across; rates are low, spreads on individual asset classes are also at very tight levels. So the yields, the actual yields, the absolute yields on investments are at low levels. There's a danger right now in this type of environment to begin to stretch for that extra 25, 50 basis points. To take on risk that may not be commensurate with your company's risk tolerance. At the end of the day you want to review policy, review the risk constraints and make sure you are invested and taking the appropriate risk that is tolerable to the company.

The first part is determining the appropriate risk constraints. What these gentlemen have already discussed is that liability characteristics play an important role in determining the risk constraints on your investment portfolio. This includes positive cash flows in the early years, negative cash flows in later years and the long duration. For a fixed-income portfolio there are really four risks that you take when investing; duration is one of four. The message from the liability characteristics is you do have some tolerance to take more duration risk in your invested assets. You can buy longer maturing securities, go longer in the yield curve and pick up some incremental yield to do so. There are also other implications, which I'll get into in just a moment.

The need for longer duration really requires appropriate management of the investment portfolio. What I mean by that is you're going to be over-weighted in certain sectors versus other sectors because of that need for duration. Which, by the way, is possibly another reason why rates are at these low levels. There are a lot of investors out there who need duration and have gone out into the Treasury market, the corporate market, to get that duration. You can't get that in mortgage-backed securities, asset-backed securities; they are traditionally shorter-duration assets. So the need for duration is actually another reason why rates and yields have fallen to the low levels they are at. But one of the impacts of the need for longer duration is you're going to be over-weighted in corporate bonds in your portfolio. You're going to have a large exposure to corporate securities because of the need for longer-duration assets. You're going to be under-weighted in shorter-duration assets, such as mortgage-backed, and asset-backed securities. Not that they won't play a role in your portfolio; they will have a small role, but not as large of an impact as the corporate market will.

Convexity is a fancy term for call risk. Convexity, or call risk, is very expensive to a portfolio that needs long duration. Companies that took a lot of call risk in their investment portfolios three or four years ago are paying the price now because a lot of those securities are being called and you're being forced to reinvest the proceeds

from those calls at lower interest rates. So the book yields on those invested assets are declining very rapidly. Though call risk is very important, positive convexity is also very important. With rates as low as they are, it may not be as much of a risk going forward from today than it was when rates were at higher levels. But it still requires very close monitoring where you're taking your call risk.

We've always recommended taking call risk in the mortgage-backed and the asset-backed security (ABS) sectors versus taking it in the corporate or the agency sector. In the agency sector, Fannie Mae and Freddie Mac make their money by calling their bonds at the most opportune time for them, which is the worst time for the investor. In the corporate market you have one or two corporate treasurers who are constantly monitoring interest rates and calling the bonds from your portfolio when it's most opportune. When you take it in the mortgage-backed sector, you're spreading that call risk among homeowners. Now we've seen a huge spike in refinancing, but there are still going to be those individuals who, regardless of where interest rates are and where the mortgage rates are, they're just not going to refinance their mortgages. So it's a less efficient call risk when you take it in the collateralized mortgage obligation (CMO) and ABS sectors.

The need for duration, which leads into an over-weight in corporate bonds, is going to require some credit management. Credit risk has been a very important topic over the last two or three years as default rates have risen to very high levels. The term fallen angels refers to investment-grade companies that have fallen to the low investment-grade companies. It hit a record high last year and although we've kind of slowed the downgrade to upgrade ratio, we're still running at relatively high levels. A lot of companies that took credit risk suffer because of defaults, or having to sell securities at losses because of lower credit rating. The reliance on rating agencies such as Moody's or Standard and Poor's (S&P) to be more proactive in your credit management of your portfolio just isn't there. They are behind the curve in terms of downgrading securities. The market punishes bond prices early on when there's a sense of falling credit, so you need some tools. The investment managers need tools to effectively manage the credit risk in your portfolio.

We recommend that our clients diversify among industries in the corporate part of the portfolio and then diversify among issuers as well. We maintain half a percentage maximum weighting to BBB-rated securities and 1 percent maximum exposure to A-rated securities. In order to have a well-diversified portfolio, no investment manager is going to be able to miss all the credit problems over a long-term period. The goal is to minimize the impact on your portfolio if credit problems do arise. One of the ways you do that is through diversification by both industry and issuers.

As I mentioned, you need to install a sell discipline to be more proactive in managing credit. We use two independent sources for credit management outside of the agencies. One is an independent credit research firm out of New York that does nothing but provide credit research, so they don't have any conflict of interest

if someone wants to write a negative credit story on Ford. They won't have the underwriting side of the firm tapping them on the shoulder saying, "You can't say anything negative on Ford today." So that's been a great help. We also use an equity-based model to be more proactive. But your investment managers do need some type of discipline to sell securities when there is a credit problem. The other way to minimize credit risk is obviously diversify into non-corporate structured products, such as ABSs, or CMOs when appropriate.

So where do we get the yield today? Well, the first thing we determine is how much risk is appropriate for the portfolio. We've already discussed the liability characteristics. This is really going to dictate the duration of your portfolio. The other things the investment manager will have to keep in mind are underwriting profitability, company leverage and also the outlook for the capital markets. We don't believe in market timing as far as the direction of interest rates, so even though rates are at very low levels, we're not going to hold cash in the hope that rates begin to move higher. We don't feel insurance companies are in the business to time markets; they're in the business to sell insurance, to reserve against or to invest against those reserves. So we're going to try to remain fully invested at all times and stay very close to the duration target that the actuaries provide us with.

The way you take risk in the fixed-income market, as I mentioned already, is duration, which basically is maturity. The longer security you purchase, the more duration risk that you're taking. Duration really is interest rate risk. Just to give you an example, if you have an asset that has a duration of five, if interest rates move up by a 100 basis points, the market value of that bond should fall by about 5 percent, and vice versa: if interest rates fall 100 basis points, the market value of that security rises by about 5 percent.

The second risk, which I also mentioned, is call risk, or convexity. Take it in appropriate sectors, but be very careful where you take it, because it could come back to hurt the portfolio in a low-interest-rate environment. Credit quality we've also discussed. If you do have the tolerance to take credit risk, there are opportunities to add yield to your portfolio, but be very diligent about it. Diversification is key, and have an appropriate strategy for managing that risk.

Finally, the fourth one, which we haven't talked about, is liquidity. The characteristics of disability insurance allow for some tolerance in taking more liquidity risk, because of the positive cash flows in early years. You could take some liquidity risks, which I'll mention in a moment, in the private placement market where you do have the opportunity to earn some incremental return versus public bonds, thus taking more liquidity risk than normal.

There is the question of sector allocation: how do you invest within the various sectors? We use a relative value analysis. It's not as simple as putting on a piece of paper the highest-yielding sector and then investing all the money in that sector. It requires analysis as far as where spreads have been historically versus where they

are now. Are you getting paid to take the risk in that sector? A number of analyses are done to determine the appropriate sector. And at the end of the day, we want to be diversified, so we're not making one bed in any one sector.

Taking interest rate risk is, as I mentioned, going out longer in the Treasury curve because of the long-duration nature of the liabilities and it allows you to go out longer. With the steep yield curve, it allows you to earn incremental return or incremental yield by going out longer. The difference between 30-year and 10-year Treasury rates is very high levels approaching almost 110 basis points, so you do have the opportunity to buy longer duration assets, because of the longer duration nature of your liabilities.

As I mentioned, spreads on corporate bonds have narrowed significantly, so there isn't a lot of yield in the corporate bond market. In the Lehman Corporate Index yields are approaching 4 percent. so the duration of this index is close to 7, which is about a 10- or 11-year average life security approaching a 4 percent yield. There isn't a lot of yield in the corporate market these days. If you go down in credit to the low investment grade, there is incremental return. We don't invest in below-investment-grade securities at AAM. But if you do have the tolerance to go into lower-rated credits, you could earn some extra yield. Even there, investors have become more risk tolerant in the last three to six months, and have begun to stretch out and buy riskier assets as they've gone into lower credit securities. The Lehman BBB Corporate Index, is now below 5 percent yield in the BBB category

As I mentioned, we like to take call risk and structured security, such as CMOs and ABSs. But even in this sector, as other investors have realized, the benefit of these sectors in the investment portfolio have driven spreads and yields to very low levels as well.

This is just a really quick reason why we like structured products. I'm not going to spend too much time on this. But basically, when I say structured products, I mean anything other than corporate bonds or agency securities that have exhibited very strong credit profiles versus corporate bonds, and higher Sharpe ratios, which are basically a measure of return per level of risk that you're taking. Including structured securities in a portfolio definitely reduces the credit volatility and provides the added diversification that is required.

We like private placement securities if you have tolerance for some liquidity risk. With private placement securities, basically a company wants to issue debt; they don't want to go through the registration process, and they issue it in a private placement format. The reason we like that is it adds further diversification to your portfolio. It provides a way to earn some incremental yield. In today's market, that yield difference isn't as great as it used to be. It's about depending on the issuer and depending on the credit. You're looking at somewhere between 25 and 40 basis points over a comparable public security. But over time that range could be as high as 70 to 100 basis points depending on the particular insurer.

One of the things you get in private placement security that you don't get in public is protective covenants that protect the investor. For example, deterioration in the company's balance sheet may force them to pay the private investors at a make whole plus par. So protected covenants are always a function of private placement securities that are not part of the public issues. You also get to structure the debt that is most favorable to your portfolio. So there are flexible terms.

Here I've put together a sample investment portfolio in today's market with today's spreads. The characteristics of this portfolio are that it has an average of single-A ratings, an A+ rating, it has an average duration of 10.25, and here's the shocking part: it has an average yield of 4.94 percent. From that 4.94 percent we subtract out the risk that we're taking, because there is cost to taking those risks. And we subtract out the call risk, the credit risk, the investment management cost and custodial fees to come up with a net earned yield of about 4.64 percent. So this is a conservative portfolio that is diversified. Among corporate bonds we have about a 10 percent allocation to private placement securities. We do have some structured bonds representing about 30 percent of the portfolio. Those are just the highlights of where new money can be invested. If you have more tolerance for credit risk you can go into below-investment-grade securities, which will enhance the yield, but not greatly. This reinforces what I mentioned earlier. Rates are low, yields are low. Be very vigilant in terms of where investment managers are taking the risk and make sure it's commensurate to the tolerance of the company.

So just to summarize, I think rates are going to move higher. The question is, when? I think there's a good probability that we can stay in a low-interest-rate environment. We may not see a pickup in the economy in the second half of this year, but over a long-term period they could move higher. When putting together the investment portfolio, the No. 1 thing to do is determine what the appropriate risk constraints are that are taken from the liability characteristics and then the investment policy. The investment managers need to review your investment policy, because therein lies the objective and the constraints that they need to manage the portfolio under. Then when you're searching for yield, again, you need to take risk, but you need to take risk that is commensurate with the company's risk tolerance. One of the strongest points we like to emphasize is diversification to minimize the risk by sector and insurer. Thank you.

**MR. MICHAEL KHALIL:** Dennis, you raised an interesting point during your presentation. You said a ceding company could recapture and that would cause the reinsurer to have to cash-out assets. I'm wondering, as reinsurers, do you have any provisions in your contracts to avoid recapture during certain interest rate periods? Like when interest rates go up above a certain threshold?

**MR. CASTILLO:** Yes, actually on some of the reinsurance contracts we have, it really depends on the amount. But on some fairly large ones we do have some market value adjustments to those types of things in the recapture provision. So, the answer is yes. But on some of the relatively small treaties there's basically

nothing on it.

**MR. KHALIL:** I have a question for Marco. I don't want to perceive it as a bias against high-yield or below investment grade. Perhaps it's because of the type of clients you have. But is the bias just because of the nature of your clients, or is it a personal bias against the high yield or what? To ask it another way, is there a place for high-yield securities with this sort of fund?

**MR. BRAVO:** I definitely believe there is a place for high-yield securities. The reason we don't anymore is we don't have the resources for a high yield. You need specific resources dedicated to the high-yield market. Most of our clients have dictated to us within their investment policy that they don't want any high- yield debt in their portfolios.

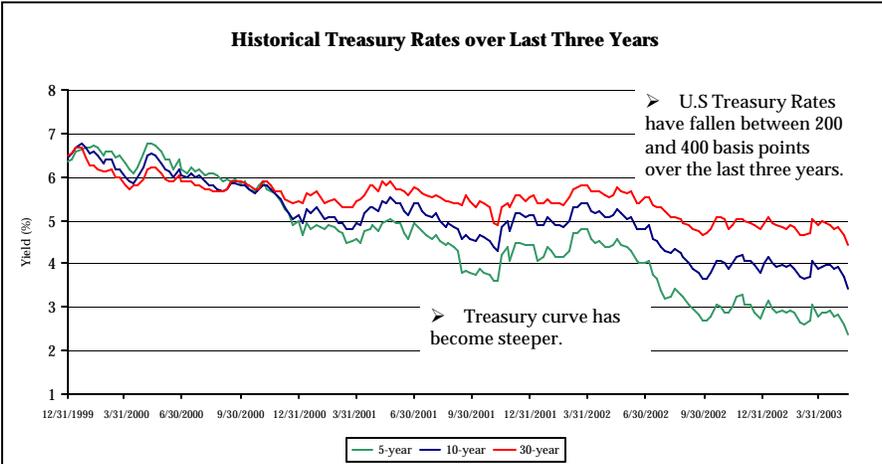
**MR. KHALIL:** As a follow-up question, with respect to mortgage-backed securities, I realize principal-only and interest-only sectors of those are getting out on the edge. But do you see a place for either of those given a certain interest rate environment?

**MR. BRAVO:** Not on the residential side. We do like interest-only securities on the commercial mortgage-backed side, because they tend to be, from a pre-payment perspective, much more stable than the residential mortgages.

Chart 1



Treasury rates are low!



Source: Bloomberg

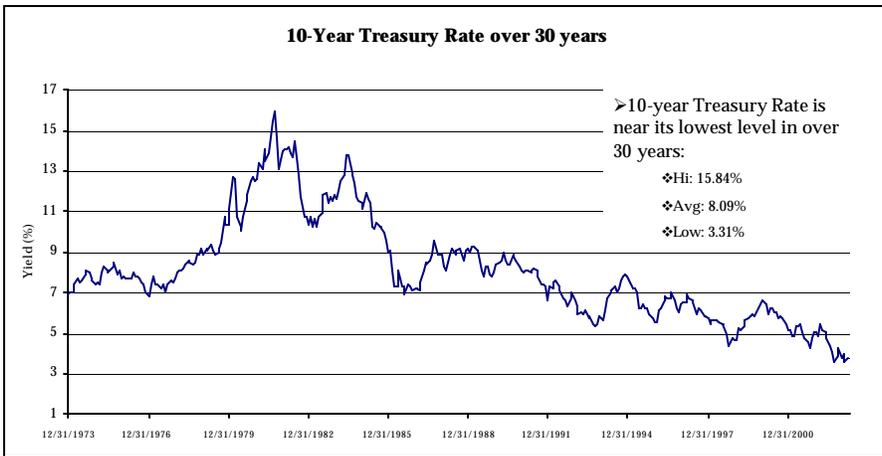
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AAM—Investment specialists to the insurance industry

Chart 2



Rates are at historically low levels.



Source: Bloomberg

4

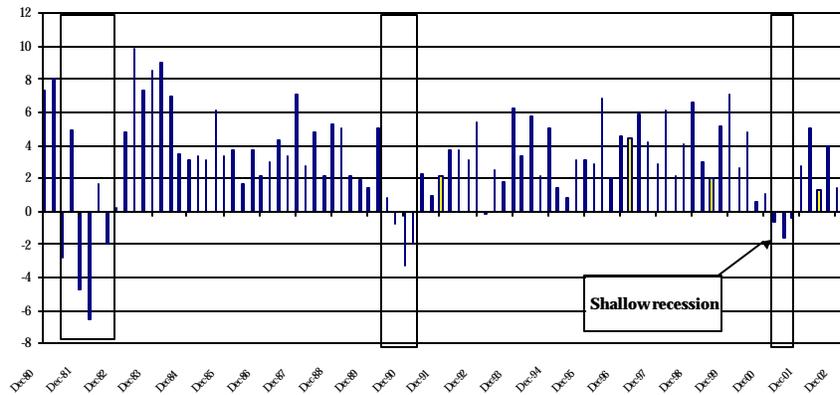
AAM—Investment specialists to the insurance industry

Chart 3

Reasons for low rates .... Slowing U.S. Economy .....



GDP Quarterly % Change S.A.



Source: Bloomberg  
Shaded area = recession

5

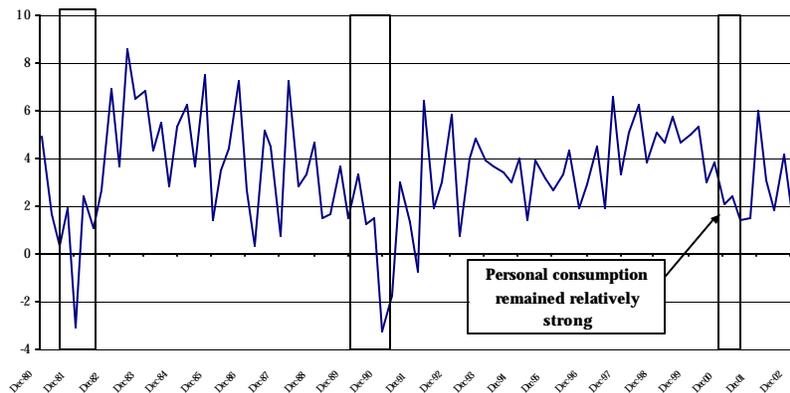
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Chart 4

.....and marginally lower consumer spending.



Personal Consumption (Quarterly % Change)



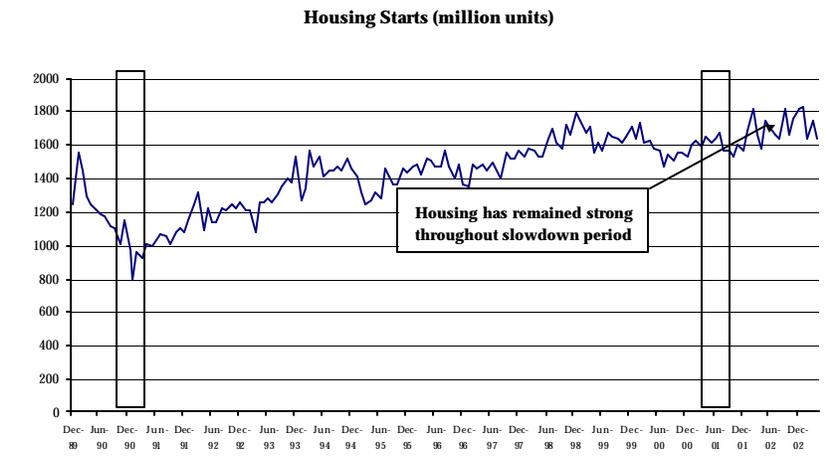
Source: Bloomberg  
Shaded area = recession

9

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Chart 5

Current state of the Economy....strong housing market....



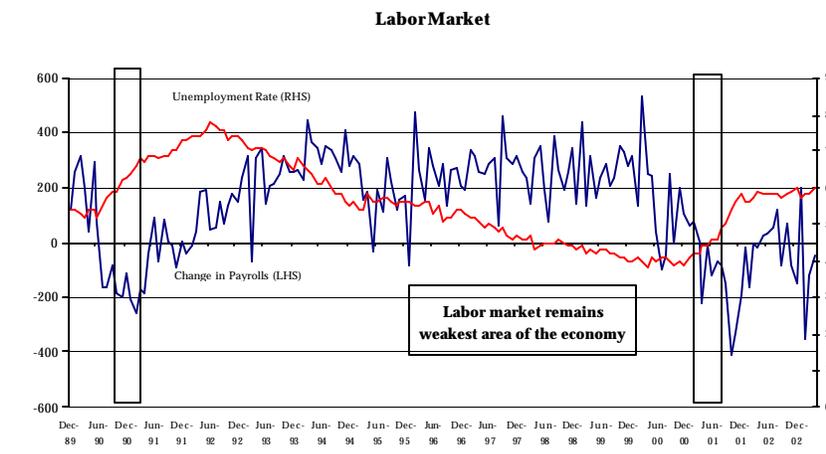
Source: Bloomberg  
Shaded area = recession

10

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Chart 6

.....weak labor market.....



Source: Bloomberg  
Shaded area = recession

11

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Chart 7

# Interest Assumption

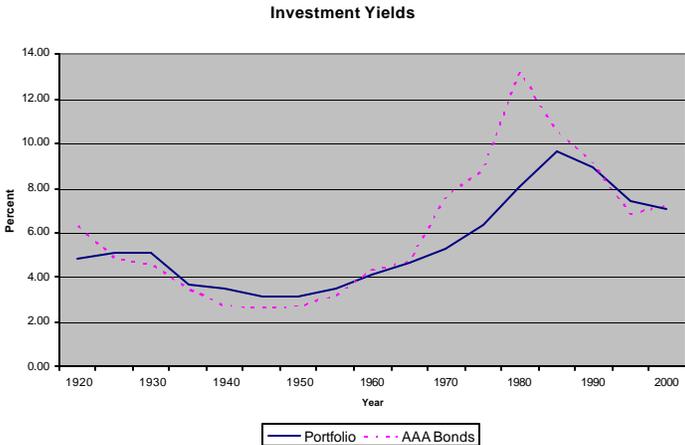


Chart 8

# Investable Asset Breakdown

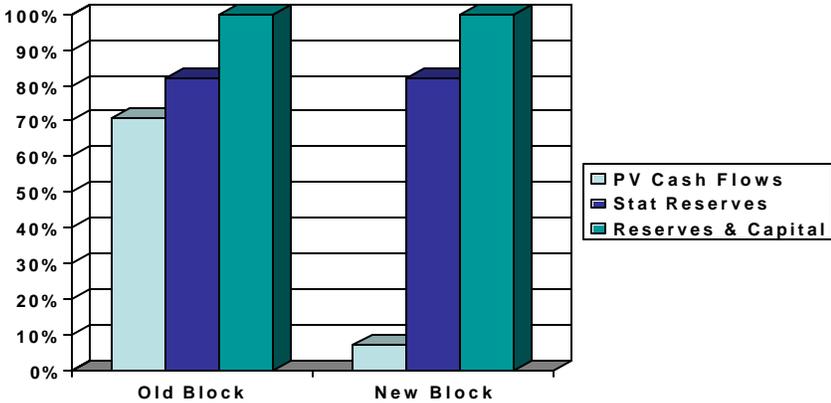
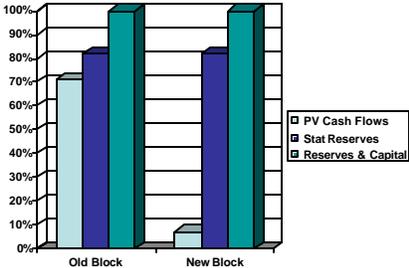


Chart 9

### Target Duration



- Old block
  - CF Duration: 10.7
  - Liability Duration with Capital at Dur 0: 7.6; at Dur 5: 9.1
- New block
  - CF Duration: 54.3
  - Liability Duration with Capital at Dur 0: 4.1; at Dur 5: 8.7

Chart 10

### Duration through time at different interest rates.

Duration through time at different interest rates

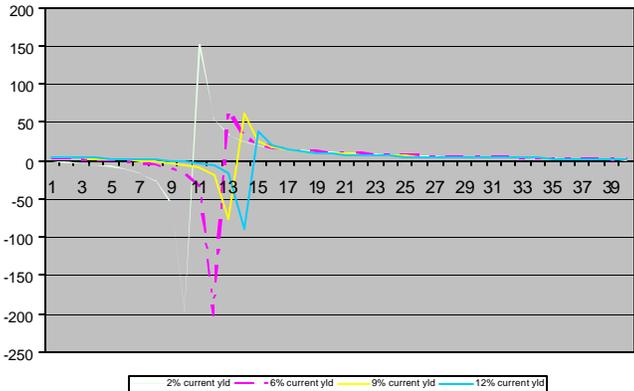


Chart 11

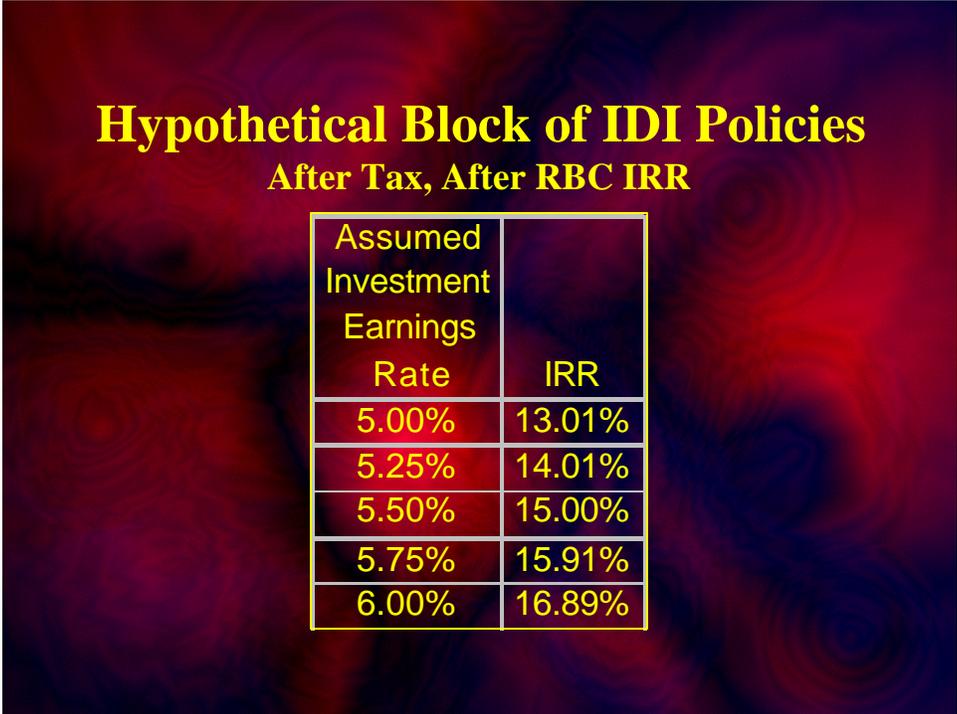


Chart 12

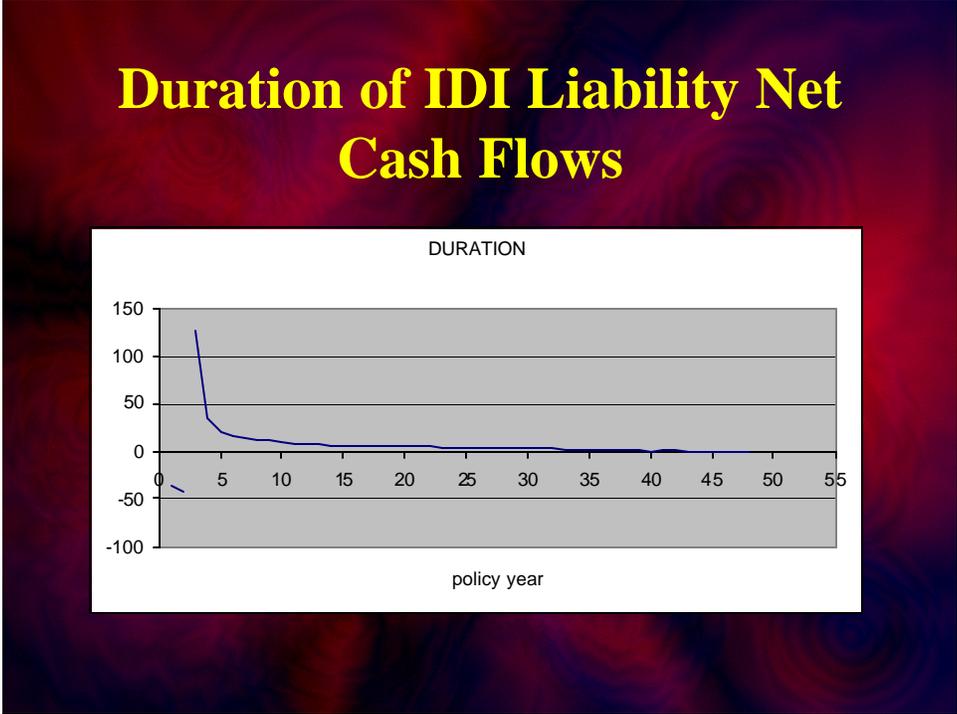


Chart 13

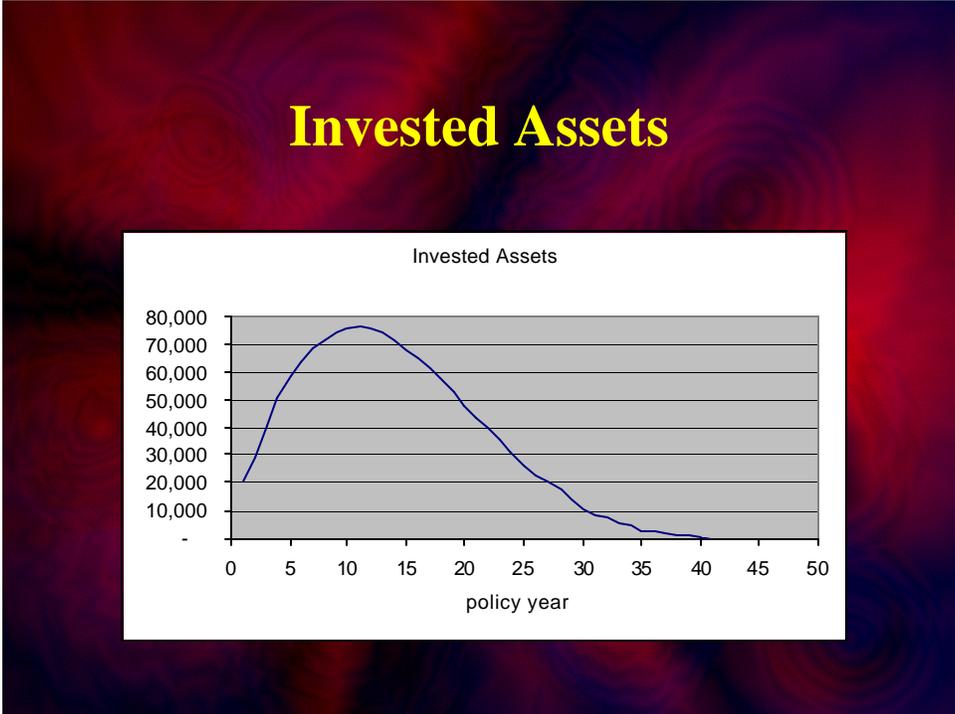


Chart 14

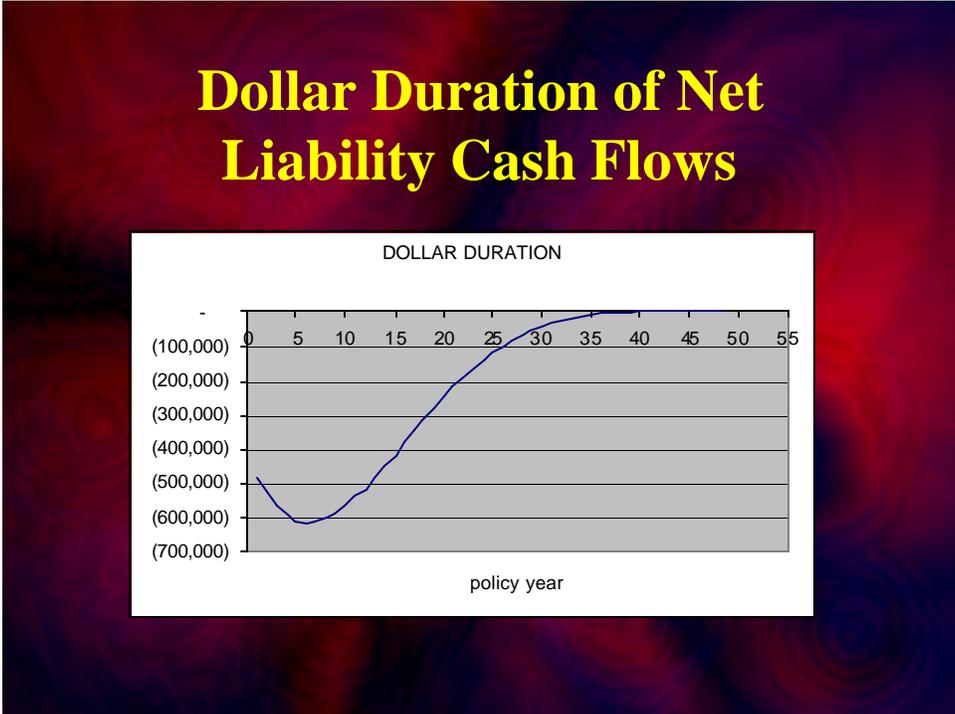


Chart 15

